

# **Supplemental Environmental Assessment**

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## **Fiscal Year 2006 Maintenance Dredging and Disposal Grays Harbor and Chehalis River Navigation Project Grays Harbor County, Washington**

**December 2005**



**US Army Corps  
of Engineers®**  
Seattle District

# **Fiscal Year 2006 Maintenance Dredging and Disposal Grays Harbor and Chehalis River Navigation Project Grays Harbor County, Washington**

## **Supplemental Environmental Assessment December 2005**

**Responsible Agency:** The responsible agency for this work is the U.S. Army Corps of Engineers, Seattle District (Corps).

**Abstract:** This document supplements the April 2001 environmental assessment (EA) prepared for maintenance of the Grays Harbor and Chehalis River navigation project during fiscal years 2001-2006. The 2001 EA evaluated the impacts of maintenance dredging and disposal activities conducted annually in order to maintain a shipping channel from the Pacific Ocean to the head of navigation at Cosmopolis, Washington.

The purpose of this supplement is to evaluate the effects of a proposed *one-time* change to the established maintenance dredging program. The Corps contractor was unable to mobilize a clamshell dredge to Grays Harbor in late summer, when dredging in the Inner Crossover Reach normally occurs. Instead, the dredge arrived at Grays Harbor in late November. Fall/winter weather conditions make use of a clamshell dredge dangerous in this exposed reach of the navigation channel. The controlling shoal in the Inner Crossover Reach still needs to be dredged prior to February to ensure that the channel can be navigated safely. The proposed change involves the use of a hopper dredge, rather than a clamshell dredge, in the Inner Crossover Reach to remove 200,000 cubic yards of material. The use of a hopper dredge will result in an increase in the number of fish, crabs, and shrimp entrained during maintenance dredging. Entrainment occurs when aquatic organisms are trapped in the uptake of sediments and water being removed by the dredging equipment; many of the organisms entrained by dredges, particularly larger crabs and fish, are killed. Given the time of year the dredging will occur and the location of this reach in Grays Harbor, relatively low numbers of organisms will be present and the impacts of entrainment are not expected to be significant. In accordance with the crab mitigation strategy, the Corps would add the crabs lost as a result of the proposed action to the total number of crabs requiring oyster shell mitigation. Use of the hopper dredge will result in lower turbidity impacts than would occur with the clamshell dredge. Use of the hopper dredge instead of a clamshell dredge in the fall/winter months will decrease potential hazards to equipment and operators.

The Corps has determined that the proposed one-time change to the Grays Harbor maintenance dredging program is not a major Federal action significantly affecting the quality of the human or natural environment, and therefore does not require preparation of an environmental impact statement.

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## 1. INTRODUCTION

Pursuant to the National Environmental Policy Act (NEPA), this environmental assessment (EA) supplements the April 2001 [Final Environmental Assessment: Fiscal Years 2001-2006 Maintenance Dredging and Disposal, Grays Harbor and Chehalis River Navigation Project, Grays Harbor County, Washington](#). The 2001 EA evaluated the impacts of maintenance dredging and disposal activities conducted annually in order to maintain a shipping channel from the Pacific Ocean to the head of navigation at Cosmopolis, Washington.

The purpose of this supplement is to evaluate the effects of a proposed *one-time* change to the established maintenance dredging program. The proposed change involves the use of a hopper dredge, rather than a clamshell dredge, in the Inner Crossover Reach.

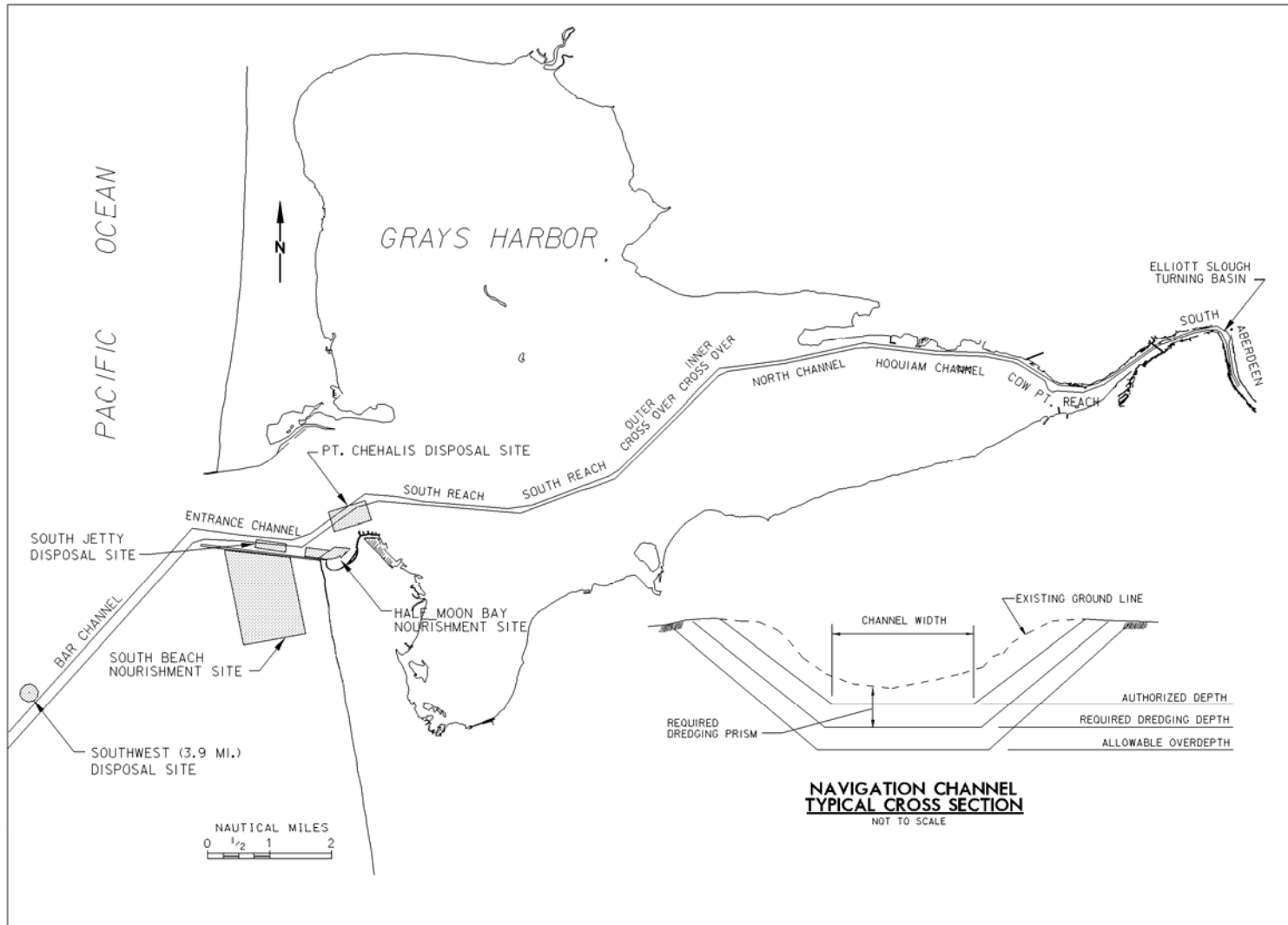
### *1.1 Background*

The 23.5 mile long Grays Harbor navigation channel is dredged annually by the U.S. Army Corps of Engineers, Seattle District (Corps) in order to maintain authorized project depths. Without annual maintenance dredging, shoaling would reduce the ability of larger ships to enter and leave the inner harbor safely under full load or low tide conditions, thereby impacting the economy of Grays Harbor County.

The navigation channel is broken up into 10 reaches, as shown in Figure 1. Channel dimensions, dredging frequencies, dredging volumes, equipment requirements, and timing requirements are provided by reach in Table 1. During the formulation of the existing maintenance dredging program, much care was taken to reduce environmental impacts. Several impact avoidance, minimization, and compensation measures have been incorporated into the maintenance program, including:

- To avoid impacts to bull trout and out-migrating juvenile salmon, the Corps does not dredge the upstream reaches (the “inner reaches”) of the channel between February 15 and July 15.
- To reduce entrainment, the inner reaches of the channel are dredged using a clamshell dredge.
- To reduce entrainment of Dungeness crabs, no hopper dredging occurs in the downstream reaches (“the outer reaches”) during periods of peak crab abundance.
- To compensate for the loss of Dungeness crabs to the commercial fishery, the Corps places oyster shell on intertidal mudflats in order to improve survival rates for young-of-the-year crabs.

**Figure 1. Grays Harbor navigation channel reaches and disposal sites**



**Table 1. FY01-06 maintenance dredging program**

REACH	ESTIMATED VOLUME (CUBIC YARDS)	DREDGE TYPE	DIMENSIONS	DISPOSAL AREA	WORK CLOSURES	WORK SCHEDULED
<b>Elliott Slough Turning Basin</b>	60,000 silt/sand biennially	Clamshell	-32' to -35' MLLW by 535' wide	South Jetty or Point Chehalis (W)	15 February to 15 July	16 July to 14 Feb
<b>S. Aberdeen</b>	55,000 silt/sand annually	Clamshell	-32' MLLW by 300-550' wide	South Jetty or Point Chehalis (W)	15 February to 15 July	16 July to 14 Feb
<b>Cow Point</b>	950,000 sandy silt annually	Clamshell	-36' MLLW by 350-725' wide	South Jetty or Point Chehalis (W)	15 February to 15 July	16 July to 14 Feb
<b>Hoquiam</b>	150,000 sandy silt annually	Clamshell	-36' MLLW by 350' wide	South Jetty or Point Chehalis (W)	15 February to 15 July	16 July to 14 Feb
<b>North Channel</b>	150,000 silty sand annually	Clamshell	-36' MLLW by 350' wide	Point Chehalis	None	August to Feb
<b>Inner Crossover</b>	200,000 silty sand annually	Clamshell	-36' MLLW by 350-450' wide	Point Chehalis	None	August to Feb
<b>Outer Crossover</b>	200,000 silty sand annually	Hopper or Clamshell*	-36' MLLW by 350' wide	Point Chehalis	No hopper after 31 May	April and May
<b>South Reach</b>	400,000 sand annually	Hopper or Clamshell*	-36' MLLW by 350-450' wide	Point Chehalis or Half Moon Bay	No hopper after 30 June	May and June
<b>Entrance</b>	400,000 sand annually	Hopper	-40' to -46' MLLW by 600-900' wide	South Jetty or Half Moon Bay or Point Chehalis	No hopper after 31 May	April and May
<b>Bar Channel</b>	250,000 sand as needed	Hopper	-46' MLLW by 900' wide	South Beach or South Jetty or 3.9 mile ocean site	No hopper after 31 May	April and May

Notes: (W)=Adverse weather/waves relief site; \* A clamshell dredge is used after May 31; Depths shown are authorized depths and do not include advanced maintenance (2') or overdepth tolerance (2'). The South Aberdeen reach has 0' advance maintenance and 1' overdepth. Widths shown are those of the channel bottom. Please see the "Navigation Channel Typical Cross Section" view in Figure 1.

### *1.2 Project Purpose and Need*

The Corps contractor was unable to mobilize a clamshell dredge to Grays Harbor in late summer, when dredging in the Inner Crossover Reach normally occurs. Instead, the dredge arrived at Grays Harbor in late November. Fall/winter weather conditions make use of a clamshell dredge dangerous in this exposed reach of the navigation channel. Hopper dredges are more suited to the rough sea conditions that can occur in Inner Crossover Reach; clamshell equipment requires two barges moored together, and this can be a hazard in choppy seas.

Additionally, dredging of the most upstream reaches of the channel (South Aberdeen - Hoquiam Reaches) must be completed before the start of the juvenile salmon out migration in mid-February. The Inner Crossover Reach does not have this timing restriction, but there is a controlling shoal in the Inner Crossover Reach that needs to be dredged prior to February to ensure the channel can be navigated safely.

### *1.3 Authority*

The original Grays Harbor navigation channel was authorized by Congress in the Rivers and Harbors Act of 1896. The Grays Harbor and Chehalis River Navigation Project and regular Department of the Army maintenance dredging were authorized by the Rivers and Harbor Act of 1935, and modified in 1945 and 1954. In 1990, the navigation channel was widened and deepened as part of the Grays Harbor Navigation Improvement Project, which was authorized by Section 202 of the Water Resources Development Act of 1986 (Public Law 99-662) in November 1986.

## **2. ALTERNATIVES EVALUATION**

### *2.1 No action*

The no action alternative consists of the existing Grays Harbor maintenance dredging program, as described in the April 2001 EA and summarized in Table 1. Under severe storm conditions, dredging would have to stop in the Inner Crossover Reach. The clamshell would likely move upstream and dredge in a more sheltered area. This would delay the removal of a controlling shoal in the Inner Crossover Reach, and not provide a safe and reliable channel for authorized deep draft navigation.

### *2.2 Proposed action*

The proposed action consists of dredging 200,000 cubic yards of material from the Inner Crossover Reach using a hopper dredge instead of a clamshell dredge.

## **3. EXISTING ENVIRONMENT**

Extensive information on the existing environment of Grays Harbor has been provided in previous technical studies, as well as environmental and biological evaluations. In particular, this information is contained in the Final Environmental Assessment for Fiscal Years 2001-2006 Maintenance Dredging and Disposal, Grays Harbor and Chehalis River Navigation Project, Grays Harbor County, Washington (U.S. Army Corps of Engineers, 2001), and is incorporated herein by reference to that document.

## **4. CONSEQUENCES OF ALTERNATIVES**

Extensive information on the environmental effects of Grays Harbor maintenance dredging and disposal activities has been provided in previous technical studies, environmental assessments, and biological evaluations. In particular, this information is contained in the Final Environmental Assessment for Fiscal Years 2001-2006 Maintenance Dredging and Disposal, Grays Harbor and Chehalis River Navigation Project, Grays Harbor County, Washington (U.S. Army Corps of Engineers, 2001), and is incorporated herein by reference to that document. Only information relevant to the proposed action is provided below.



A one-time change in dredging equipment used in the Inner Crossover Reach would result in three impacts that differ from the environmental effects described in previous NEPA documents for the Grays Harbor maintenance dredging program (i.e., the no action alternative).

#### *4.1 Turbidity and Suspended Solids Impacts*

The first change is a decrease, as compared to the no action alternative, in water quality impacts during dredging of the Inner Crossover Reach. This decrease would occur because hopper dredges stir up less sediment than clamshell dredges. Elevated turbidity levels occur as the bucket of the clamshell dredge impacts and withdraws from the channel bottom and is lifted through the water column. By contrast, hopper dredges hydraulically suction material and transfer it to an internal hopper bin with a discharge of turbidity below the water surface into the water column. Turbidity levels are less at the sediment/water interface at the bottom of the water column than with a clamshell dredge.

#### *4.2 Entrainment Impacts*

The second change is an increase in entrainment of marine organisms, including crabs, fish and shrimp, as compared to the no action alternative. Entrainment impacts are evaluated below.

##### *4.2.1. Dungeness Crab*

Reine and Clarke (1998) compiled entrainment rates from all entrainment studies conducted in Grays Harbor between 1975 and 1989. Four sampling efforts occurred in the middle portion of the estuary, all between May and September. Entrainment rates ranged from 58 crabs per 1000 cubic yards (kcy) to 107 crabs per kcy. In December, entrainment rates would be lower as there are fewer crabs in the harbor during the winter months (see Table 2).

**Table 2. Average seasonal Dungeness crab densities (crabs/hectare), 1996-1999**

		<b>Bar</b>	<b>Entrance</b>	<b>South Reach</b>	<b>Crossover to Aberdeen</b>
0+ crab	Apr-May	4.21	198.90	137.85	2900
	Jun-Sep	753.72	10345.36	6271.60	353
	Oct-Dec	450.45	820.12	448.76	<b>319</b>
	Jan-Mar	8.16	196.13	107.26	248
1+ crab	Apr-May	23.28	763.81	2875.49	157
	Jun-Sep	287.09	1184.15	1397.46	176
	Oct-Dec	239.19	710.02	1187.15	<b>91</b>
	Jan-Mar	46.91	142.23	367.74	24
>1+ crab	Apr-May	89.84	392.84	1395.16	62
	Jun-Sep	729.98	591.48	614.14	38
	Oct-Dec	198.06	159.71	402.64	<b>33</b>
	Jan-Mar	46.91	142.23	367.74	10
Total	Apr-May	117.34	1355.55	4408.50	3119
	Jun-Sep	1770.80	12120.98	8283.20	567
	Oct-Dec	887.69	1689.85	2038.55	<b>443</b>
	Jan-Mar	101.97	480.60	842.74	282

Small crabs pass through the dredge pump virtually unharmed, but larger crabs may be crushed by the pump mechanism or harmed by debris sucked into the drag-arms (McGraw et al. 1988). Post-entrainment mortality rates range from 5% for 7 to 10 mm crabs to 86% for crabs over 75 mm (Wainwright et al. 1992). Between October and December, 0+ crabs range in size from 31 to 40 mm and their mortality rate is 20% (Wainwright et al. 1992).

As shown in Table 2, crab densities in Crossover Reach during December would be low. Since entrainment is density-dependant, entrainment rates would be also be low. As shown in Table 2, most crabs present in Crossover Reach during December would be 0+ crabs. These small crabs would have low post-entrainment mortality rates.

A very conservative estimate of the entrainment rate for the proposed action would be the low end of the summer range identified by Reine and Clarke (1998), or 58 crabs per kcy. Since 200,000 cubic yards would be dredged under the proposed action, an estimated 11,600 crabs could be entrained. Given the age class distribution provided in Table 2, 72% or 8,350 of these crabs would be 0+. These small crabs would have a low 20% mortality rate, meaning that less than 5,000 crabs (20% of the 0+ crabs plus all of the older crabs) would be killed by the proposed action. This impact would not be significant. By comparison, 1.3 million 0+ crabs were produced by the shell mitigation plots in 2004 alone (2005 data are not yet available). However, in accordance with the crab mitigation strategy, the Corps would add the crabs lost as a result of the proposed action to the total number of crabs requiring oyster shell mitigation.

#### 4.2.2. Sand Shrimp

Sand shrimp (*Crangon* spp.) were the most numerically abundant organisms entrained by dredges during Grays Harbor Dungeness crab entrainment studies. Sand shrimp are an important prey item for estuarine organisms, including Dungeness crabs, several species of fish, harbor seal pups, and several species of birds.

Armstrong et al. (1982) evaluated the distribution and abundance of the three species of crangonid shrimp which occur in Grays Harbor. Sand shrimp showed sharp seasonal changes in abundance with the highest densities occurring in spring and summer (May-August). During the winter months, the greatest abundance of shrimp occurred adjacent to Whitcomb Flats and in North Bay. In Crossover Reach, densities ranged from over 300 shrimp per 100 m<sup>2</sup> in July to less than 25 shrimp per 100 m<sup>2</sup> in November.

Given the timing and location of the proposed dredging, sand shrimp densities will be low and entrainment impacts are not expected to be significant.

#### 4.2.3. Fish

In a review of ten years (1979-1989) of entrainment data from Grays Harbor, McGraw and Armstrong (1990) identified twenty-eight species of fish in samples captured during dredging. Pacific sand lance (*Ammodytes hexapterus*) were entrained at the highest rate (594 per 1000 cubic yards, or kcy), followed by Pacific staghorn sculpin (*Leptocottus armatus*, 92 per kcy) and Pacific sanddab (*Citarichthys sordidus*, 76 per kcy). The greatest entrainment rates and number of species occurred in the South Reach during the summer months. A comparison of trawl data with the entrainment data indicates that larger crabs and some fish actively avoided the dredges.

Only one sampling effort reviewed by McGraw and Armstrong (1990) occurred during fall months. Six species were entrained during dredging in South Reach in November-December 1978. Mean entrainment rates for each can be found in Table 3. Rates for Pacific staghorn sculpin were the highest (81 per kcy), followed by Pacific sanddab (21 per kcy). Three species with designated essential fish habitat (EFH) were entrained during this fall sampling: English sole (*Pleuronectes vetulus*), Pacific sanddab, and sand sole (*Psettichthys melanostictus*). No sand lance were captured in November or December. The lack of sand lance during fall months is consistent with data from a more extensive entrainment sampling effort at the mouth of the Columbia River (Larson and Moehl 1990). No information on entrainment rates in Crossover Reach during November and December is available.

**Table 3. Mean fish entrainment rates (number of fish per 1000 cubic yards dredged) for hopper dredges in South Reach, November and December 1978**

Species	November	December
Bay pipefish ( <i>Syngnathus leptorhynchus</i> )	6	0
Buffalo sculpin ( <i>Enophrys bison</i> )	6	0
English sole ( <i>Pleuronectes vetulus</i> )	6	0
Pacific sanddab ( <i>Citharichthys sordidus</i> )	19	21
Pacific staghorn sculpin ( <i>Leptocottus armatus</i> )	81	62
Sand sole ( <i>Psettichthys melanostictus</i> )	6	0

Source: McGraw and Armstrong, 1990

Table 4 compares mean entrainment rates in South Reach and Crossover Reach during the summer months. Mean entrainment rates were higher in South Reach, except for Pacific tomcod (8 key in Crossover versus 2 key in South Reach). Eight species with designated EFH were entrained in South Reach during the summer sampling; no species with designated EFH were entrained in Crossover Reach.

Review of the available data indicates that the proposed action would likely result in relatively low levels of entrainment for a few fish species. The higher entrainment rates documented in previous studies would not be expected to occur because of the timing (November-December) and location (less saline upstream reach) of the proposed dredging. Pacific staghorn sculpin and Pacific sanddab are the species most likely to be affected by the proposed action. Based on the available data, the Corps would expect entrainment of less than 20,000 sculpin and less than 6,000 sanddab. Actual rates would be dependant on densities of these species during dredging operations.

English sole and sand sole may also be affected, but at a lower rate (likely less than 2,000 of each species). McGraw and Armstrong (1990) concluded that the entrainment data from Grays Harbor do not indicate any substantial impacts to major commercial or sport fish species. They went on to suggest that high rates of entrainment of staghorn sculpin may reduce predation rates on some other fish species and Dungeness crabs which they consume. Therefore, impacts of the proposed action would not be significant.

**Table 4. Mean fish entrainment rates (number of fish per 1000 cubic yards dredged) for hopper dredges in South Reach and Crossover Reach, May-October 1980 and August 1986**

Species	South Reach 5-10/1980	Crossover Reach 5-10/1980	South Reach 8/1986	Crossover Reach 8/1986
Arrowtooth flounder ( <i>Atheresthes stomias</i> )	0	0	22	0
English sole ( <i>Pleuronectes vetulus</i> )	35	0	25	0
Flatfish (unidentified) (Pleuronectiformes)	0	0	28	4
Kelp greenling ( <i>Hexagrammos decagrammus</i> )	0	0	1	0
Lingcod ( <i>Ophiodon elongatus</i> )	2	0	0	0
Northern anchovy ( <i>Engraulis mordax</i> )	18	0	0	0
Pacific sanddab ( <i>Citharichthys sordidus</i> )	2	0	0	0
Pacific sandfish ( <i>Trichodon trichodon</i> )	2	0	0	0
Pacific sand lance ( <i>Ammodytes hexapterus</i> )	0	0	175	0
Pacific staghorn sculpin ( <i>Leptocottus armatus</i> )	92	27	47	8
Pacific tomcod ( <i>Microgadus proximus</i> )	0	0	2	8
Saddleback gunnel ( <i>Pholis ornata</i> )	5	0	5	4
Sand sole ( <i>Psettichthys melanostictus</i> )	0	0	5	0
Snake pricklyback ( <i>Lumpenus sagitta</i> )	0	0	8	0
Speckled sanddab ( <i>Citharichthys stigmaeus</i> )	3	0	0	0
Starry flounder ( <i>Platichthys stellatus</i> )	0	0	2	0
Surfperch (Embiotocidae)	0	0	1	0

Source: McGraw and Armstrong, 1990

#### *4.3 Safety and Equipment*

The no action alternative would increase the risk of equipment damage and staff injuries attributable to the use of clamshell equipment in rough seas. Fall/winter weather conditions make use of a clamshell dredge dangerous in this exposed reach of the navigation channel. Hopper dredges are more suited to the rough sea conditions that can occur in Inner Crossover Reach; clamshell equipment requires two barges moored together, and this can be a hazard in choppy seas. Under severe storm conditions, dredging would have to stop in the Inner Crossover Reach. The clamshell would likely move upstream and dredge in a more sheltered area. This would delay the removal of a controlling shoal in the Inner Crossover Reach, and not provide a safe and reliable channel for authorized deep draft navigation. Under the proposed action, a hopper dredge would be able to operate during rough seas in the Inner Crossover Reach while providing safer conditions than would be found on a clamshell dredge.

### **5. MITIGATION**

The loss of Dungeness crabs through entrainment will be quantified and mitigated using the procedures established in the 1998 inter-agency [Grays Harbor Navigation Improvement Project Revised Crab Mitigation Strategy Agreement](#). It is expected that the proposed action would result in a very small increase in the amount of oyster shell mitigation required for incremental maintenance dredging. New shell will be placed on the existing mitigation plots in spring 2006.

The proposed action was coordinated with all the signatories to the crab mitigation agreement, and no objections were raised (see Appendix A).

### **6. COORDINATION**

The following agencies participated in the review of the proposed one-time change to the Grays Harbor maintenance dredging program:

- U.S. Fish and Wildlife Service (USFWS)
- Washington Department of Ecology (Ecology)
- Washington Department of Fish and Wildlife (WDFW)
- National Marine Fisheries Service (NMFS)
- U.S. Environmental Protection Agency (EPA)
- Quinault Indian Nation

## **7. ENVIRONMENTAL COMPLIANCE**

### *7.1 National Environmental Policy Act*

This supplemental environmental assessment (EA) satisfies the documentation requirements of NEPA. A Finding of No Significant Impact (FONSI) is attached. A notice of preparation was issued to solicit information on the environmental impacts of the proposed action (see Appendix B). The comment period for this notice extended from November 21 to December 6, 2005. No comments were received.

### *7.2 Endangered Species Act*

The Corps initiated programmatic Section 7 consultations for the Grays Harbor maintenance dredging program with USFWS and NMFS in late 2000. Annual maintenance dredging occurs under concurrence letters received in March 2001 (NMFS) and March 2005 (USFWS). The proposed action was discussed with both agencies by telephone and email. The Corps determined that the proposed action would not change the effect determinations made in the 2000 programmatic biological evaluation for the maintenance dredging program. USFWS and NMFS concurred with this determination via email (see Appendix C).

### *7.3 Magnuson-Stevens Fishery Conservation and Management Act*

The evaluation of maintenance dredging impacts to essential fish habitat (EFH) occurred as part of the Section 7 consultations with NMFS described above. NMFS determined that the proposed action would not have a significant effect on EFH species (see Appendix C).

### *7.4 Clean Water Act*

In 2001, the Corps prepared a 5-year 404(b)(1) evaluation to document the Corps' findings regarding this project pursuant to Section 404 of the Clean Water Act. The proposed change to the maintenance dredging program would have no effect on the disposal of material dredged from Crossover Reach. Both types of dredges dispose material at the dispersive Point Chehalis disposal site by bottom-dump.

The Corps received a Section 401 Water Quality Certification for the maintenance dredging program from the Washington Department of Ecology in April 2001. The proposed action was discussed with Ecology by telephone and email. Ecology determined that an amendment to the 401 certification was not required (see Appendix C).

### *7.5 Coastal Zone Management Act*

The Corps prepared a Coastal Zone Management Act Consistency Determination for maintenance dredging program in 2001. This evaluation established that the maintenance program complies with the policies, general conditions, and general activities specified in the Grays Harbor County Shoreline Management Master Plan, the City of Westport Shoreline

Management Master Plan, and the Grays Harbor Estuary Management Plan. The Corps determined that the maintenance dredging program is consistent to the maximum extent practicable with the State of Washington Shoreline Management Program, and Ecology concurred with this determination. The proposed action would not change any determination made in the consistency determination.

#### *7.6 National Historic Preservation Act*

Since the proposed dredging is confined to the removal of recently deposited sediments within the previously dredged channel width and depth boundaries, no submerged cultural resources will be affected by the project.

### **8. CONCLUSION**

Based on the preceding environmental assessment, Seattle District has determined that the proposed change to the established Grays Harbor maintenance dredging program is not a major Federal action significantly affecting the quality of the human or natural environment, and therefore does not require preparation of a Federal environmental impact statement.

### **9. REFERENCES**

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